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# PLANETARY PHENOMENA FOR NOVEMBER AND DECEMBER, 1905.

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BY MALCOLM MCNEILL.

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## PHASES OF THE MOON, PACIFIC TIME.

First Quarter, Nov. 3, 5 <sup>h</sup> 39 <sup>m</sup> P.M.	First Quarter, Dec. 3, 10 <sup>h</sup> 38 <sup>m</sup> A.M.
Full Moon, " 11, 9 11 P.M.	Full Moon, " 11, 3 26 P.M.
Last Quarter, " 19, 5 34 P.M.	Last Quarter, " 19, 4 9 A.M.
New Moon, " 26, 8 47 A.M.	New Moon, " 25, 8 4 P.M.

*Mercury* is an evening star at the beginning of the month, having passed superior conjunction on October 12th, but is not far enough away from the Sun to be seen after sunset for ten days or so after November 1st. It comes to greatest east elongation ( $21^{\circ} 41'$ ) on the evening of November 26th, and then remains above the horizon not quite an hour and a half after sunset. The interval does not become less than one hour until several days after December 1st. The planet will therefore be favorably situated for evening view for three weeks or more. After December 1st the planet rapidly nears the Sun; and passes inferior conjunction December 15th becoming a morning star. It rapidly recedes from the Sun after this, and by the end of the month is well out toward greatest west elongation. It will rise an hour and three quarters before sunrise on December 31st, and it may therefore be seen in the early morning twilight during the last few days of the year.

*Venus* remains a morning star, but is gradually drawing nearer to the Sun in their common eastward motion. On November 1st it rises a little more than two hours before sunrise, on December 1st an hour and a half before, and on December 31st about three quarters of an hour before. Its distance from the Sun will diminish from  $23^{\circ}$  on November 1st, to  $12^{\circ}$  on December 31st. It will move  $60^{\circ}$  eastward and  $20^{\circ}$  southward among the stars from the middle of *Virgo* through *Libra* and *Scorpio* into *Sagittarius*. It is in conjunction with *Mercury*  $2^{\circ} 30'$  south of the latter on December 21st. *Mercury* is then almost too close to the Sun to be seen; but the superior brightness of *Venus* will make it a compara-

tively easy object, and may help in finding the fainter planet. *Venus* is still increasing its distance from the Earth, although not at so rapid a rate as during the autumn. At the end of December it will be about six times as far away as it was when in inferior conjunction in April.

*Mars* remains an evening star, and changes the time of its setting scarcely at all during November and December. It sets at a few minutes after 9 p. m. throughout the whole period. Its apparent distance from the Sun diminishes about  $18^\circ$  during this time; but whereas *Mars* was  $10^\circ$  south of the Sun on November 1st, it is  $11^\circ$  north on December 31st. This cause counterbalances the tendency to earlier setting due to diminishing distance from the Sun, and the time of the planet's setting varies only four minutes throughout the period. It moves  $46^\circ$  eastward and  $13^\circ$  northward among the stars from the eastern part of *Sagittarius* through *Capricorn* into *Aquarius*. Its distance from the Earth in millions of miles increases from 128 to 161, and its brightness diminishes about 40 per cent. It will, however, be easy to identify, as, although much fainter than before, it will be the brightest object in that part of the sky except *Saturn*, and it is readily distinguished from the latter by its ruddy color. It will be in close conjunction with *Saturn* on the night of December 25th (Christmas night), the closest approach being about equal to the Moon's diameter, *Mars* being to the north. Four days later the Moon passes both planets—*Saturn* at 9:18 p. m. and *Mars* at 2:30 a. m. on the night December 29-30th. As seen from certain parts of the Earth both planets will be occulted, but the occultations cannot be seen from the United States.

The present period will be very favorable for observation of *Jupiter*. It rises at 6:20 p. m. on November 1st, at 4:50 p. m. on December 1st, and at about 2 p. m. on December 31st. It is in opposition with the Sun on November 24th, and is consequently visible throughout nearly the entire night. It is in the constellation *Taurus*, and moves about  $7^\circ$  westward from a position near *Aldebaran*,  $\alpha$  *Tauri*, to a place a little south of the *Pleiades*. At this opposition and the one occurring a year later the planet will have nearly its maximum northern declination, and will in consequence attain its highest altitude above the horizon. The Moon and planets "run high" during winter oppositions.

*Saturn* is in the southwestern sky in the evening. It sets shortly after midnight on November 1st, and before 9 p. m. on December 31st. It is near the western boundary of *Aquarius* and moves about  $3^{\circ}$  west and north during the month. Its conjunction with *Mars* on December 25th has already been noted.

*Uranus* is an evening star until December 26th, when it comes to conjunction with the Sun. On November 1st, it does not set until three hours after sunset, but even then it will be too low down for easy view by the time twilight has diminished sufficiently to allow such a faint object to be seen.

*Neptune* is in opposition with the Sun on the morning of December 31st.

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